

**CARIDINA PEDICULTRATA, A NEW FRESHWATER ATYID SHRIMP
(CARIDEA: ATYIDAE) FROM HUNAN PROVINCE, CHINA**

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A new freshwater atyid shrimp, *Caridina pedicultrata* from high elevation (800m) in Hunan Province, China is described. It has a long, non-tapered endopod on the first male pleopod, well developed and trapezoidal appendix masculina which is almost as long as the endopod and bearing relatively short hamate setae, distinctive pereopod shape, spination and segmental ratios, shape and spination of the posterior telsonic margin and large eggs. Ten species of *Caridina* and one of *Neocaridina* are now known from Hunan Province. □ Crustacea, Atyidae, *Caridina pedicultrata*, new species, Hunan Province, China.

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The ten known species of atyid shrimps from Hunan Province, China are *Caridina ablepsia* Guo, Jiang & Zhang, 1992, *C. baojingensis* Guo, He & Bai, 1992, *C. glossopoda* Liang, Guo & Gao, 1993, *C. hofendopoda* Shen, 1948, *C. hunanensis* Liang 1993, *C. lanceifrons*, Yu, 1938, *C. lima* Liang, Guo & Gao, 1993, *C. longispina* Guo, He, Xu & Gui, 1992, *C. spinosa* Liang, 1964 and *Neocaridina denticulata* de Haan, 1844.

On 15th August 1992, numerous specimens of a new atyid shrimp were collected from a small freshwater stream near Huaihua City, Hunan (c. 27°40'N, 110°11'E) by Zhaoliang Guo. The collection site is in a col (altitude c.800m) of Xuefeng Mountain, with rice fields nearby. The stream has a rocky bed, is 1-2m wide and 0.2-1.1m deep. The primary type specimens are in the collection of the Hunan Agricultural College (HAC). Some male and female paratypes are deposited in the Queensland Museum (QMW).

SYSTEMATICS

Family ATYIDAE

Caridina H. Milne Edwards, 1837

Caridina pedicultrata sp. nov.

(Figs 1,2)

MATERIAL EXAMINED

HOLOTYPE: 1 adult male, total length (TL) 15.7mm, post-orbital carapace length (CL) 4.6mm, pre-orbital rostral length (RL) 0.79mm.

ALLOTYPE: 1 ovigerous female, TL 18.7mm, CL 5.8mm, RL 1.0mm.

PARATYPES: HAC, 5 ♀, 5 ♂; QMW19898, 2 ♀, 2 ♂

DESCRIPTION

Body. Small, slender, subcylindrical; males up to 17.7mm TL, females up to 21.4mm TL.

Rostrum (Fig. 1A,B). Short and rather high, 0.13-0.21 of CL; reaching or extending beyond tip of eyes; either convex or straight, tip often slightly curved downwards; setose and typically unarmed or sometimes with 1-3 dorsal teeth and 1 ventral tooth placed distally; lateral carina dividing rostrum into two unequal parts, continuing posteriorly to orbital margin.

Eyes (Fig. 1A,B). Small, on short ocular peduncle; cornea globular, well developed.

Carapace (Fig. 1A). Rough, surface covered with microspinules; branchiostegal groove conspicuous. Pterygostomial angle broadly rounded, slightly produced anteriorly. Antennal spine below lower orbital angle, short but strong.

Antennule (Fig. 1A,B). Stylocerite 0.79 length of basal segment; second segment about 0.45 length of basal antennular segment and about 1.1 times as long as third segment; all segments with plumose setae (setal terminology after Felgenhauer, 1992). Flagella long, simple.

Antenna (Fig. 1A). Scaphocerite reaching tip of antennular peduncle; outer margin straight, asetose, ending in strong subapical spine; proximal lamella and interior margin with plumose setae.

Mandibles, maxillula, maxilla, first and second maxillipeds and branchial formula. Typical for genus, as described for other species (Choy & Ng, 1991; Choy, 1992).

Third maxilliped (Fig. 1C). Reaching beyond tip of scaphocerite; basal segment of endopod

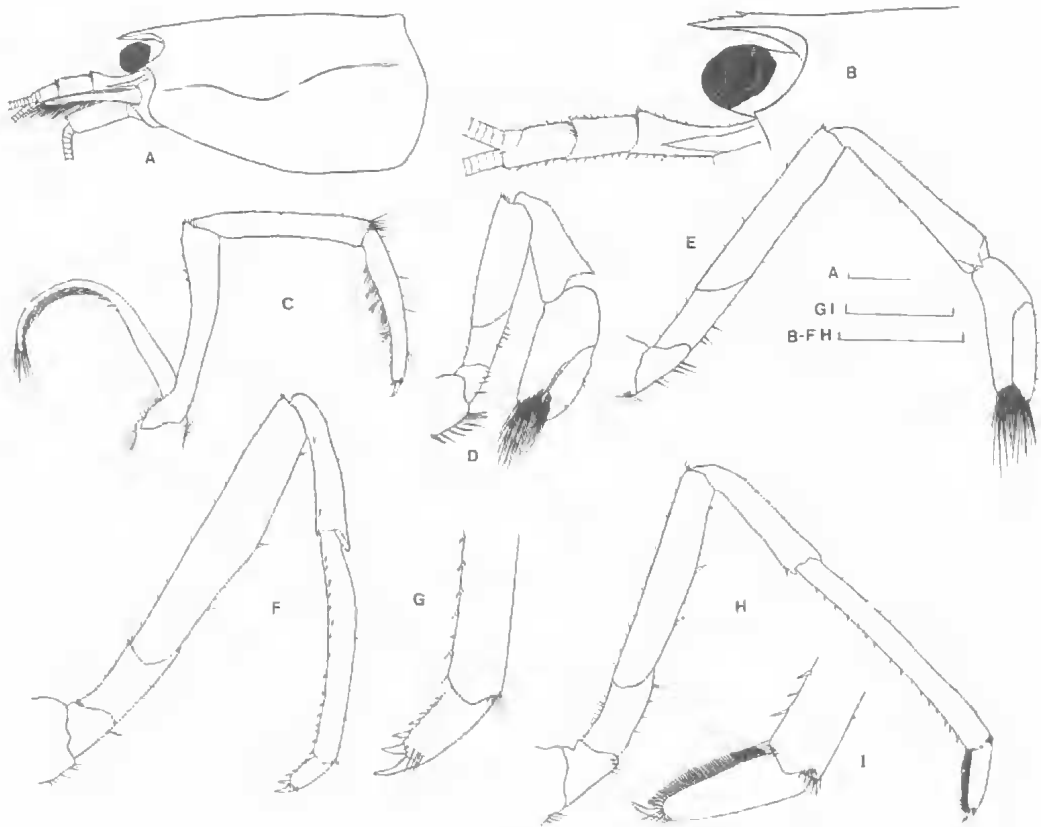


FIG. 1. *Caridina pedicultrata* sp. nov. A, holotype male; B, paratype male. A, cephalothorax; B, rostral and antennular region; C, third maxilliped; D, first pereopod; E, second pereopod; F, third pereopod; G, dactylus of third pereopod; H, fifth pereopod; I, dactylus of fifth pereopod. Scales: A-F, H = 1.0mm; G, I = 0.4mm.

about 5.2 times as long as broad, with few hamate setae on distal outer margin. Penultimate segment about 6.6 times as long as broad and about 0.87 length of basal segment. Distal segment about 0.87 length of penultimate segment, ending in large claw-like apical hamate seta surrounded by simple and pappose setae, behind which there are about 8-11 smaller hamate setae on distal third of posterior margin; proximally a clump of serrate and pappose setae. Exopod reaching about 0.5 of penultimate endopod segment, distal margin with plumose setae.

First pereopod (Fig. 1D). Reaching about tip of eye. Chela 2.0-2.5 times as long as wide, about 1.0-1.3 times length of carpus; movable finger about 3.1-4.4 times as long as wide, 1.0-1.6 times length of palm; setal brushes well developed. Carpus attached to chela ventrally,

excavated disto-dorsally, 1.7-2.1 times as long as wide, shorter than chela, about 0.83-1.02 length of merus. Ischium about 0.38-0.51 length of merus.

Second pereopod (Fig. 1E). Reaching beyond tip of scaphocerite, more slender and longer than first pereopod. Chela 2.7-3.6 times as long as broad, about 0.67-0.96 length of carpus, movable finger about 4.0-4.8 times as long as wide and 1.5-1.7 times length of palm; setal brushes well developed. Carpus slightly excavated distally, 4.5-6.0 times as long as broad, much longer than chela, about same length as merus. Ischium about 0.30-0.43 length of merus.

Third pereopod (Fig. 1F, G). Reaching base of dactylus, about 0.25 of propodus reaching distal scaphocerite. Dactylus 2.2-2.9 times as long as wide, ending in prominent claw-like hamate seta,

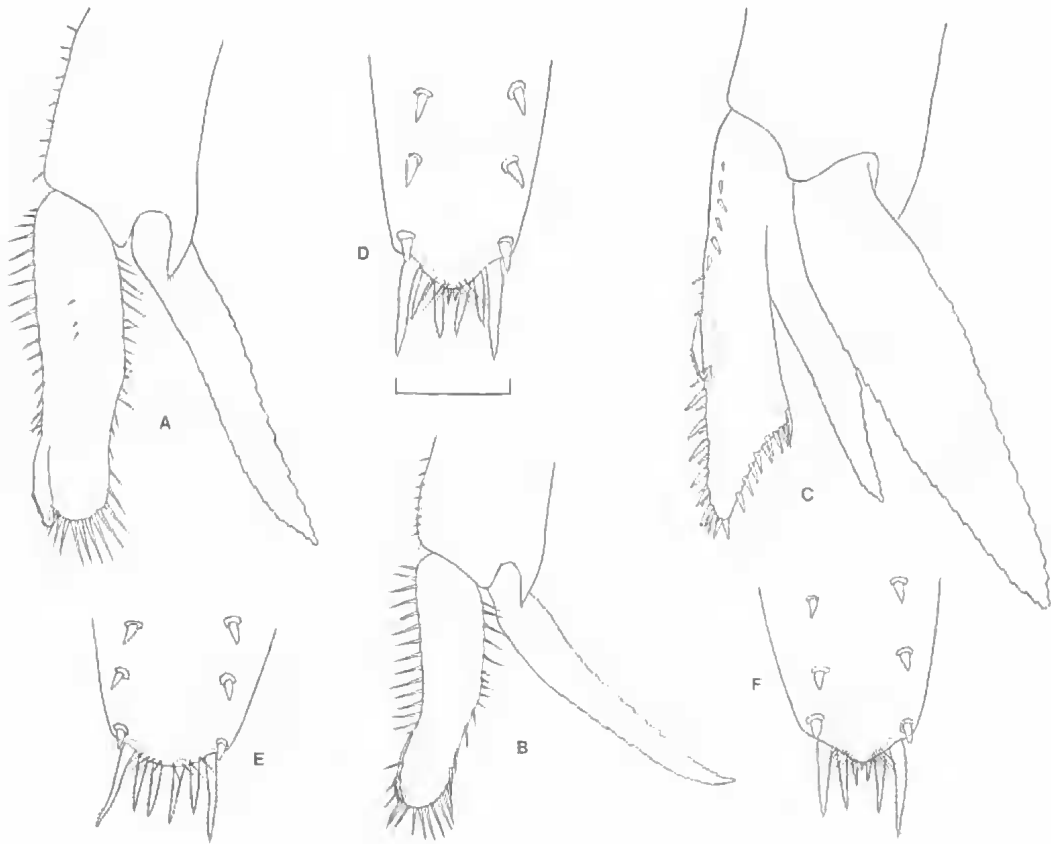


FIG. 2. *Caridina pedicultrata* sp. nov. A, B, first pleopod of male; C, second pleopod of male; D-F, dorso-posterior region of telson. Scales: A-C = 0.5mm; D-F = 0.4mm.

behind which posterior margin bears 4-6 shorter hamate setae, reducing in size proximally. Propodus 8.2-9.7 times as long as wide, 4.8-5.2 times length of dactylus, posterior margin bearing numerous small hamate setae. Carpus about 0.67-0.85 length of propodus, well developed distal projection, posterior and lateral surface with hamate setae. Merus about 1.5-1.9 times as long as carpus, slightly bowed, with few hamate setae along posterior margin. Ischium about 0.33 length of propodus, twice that of basis.

Fourth pereopod. Similar to third.

Fifth pereopod (Fig. 1H,I). Reaching middle of second segment of antennular peduncle. Dactylus 2.9-3.8 times as long as wide, ending in claw-like apical hamate seta, bearing comb-like row of 42-54 hamate setae on posterior margin. Propodus 7.9-10.7 times as long as wide, 3.8-5.8 times length of dactylus, bearing numerous short

hamate setae on posterior margin. Carpus about 0.42-0.57 length of propodus, bearing distal projection and distal hamate seta. Merus distinctly shorter but wider than propodus, with 2-3 large hamate setae. Ischium about twice length of basis, with simple and pappose setae.

First pleopod (Fig. 2A,B). Endopod in male compressed, ovate, a little wider proximally, very long, about 0.82 length of exopod, about 3.7 times as long as wide, extreme portion slightly bent, inner border usually concave at distal 0.4, but almost straight in some specimens, outer border noticeably convex at middle, slightly concave at distal 0.3, both with marginal spine-like simple seta. Appendix interna well developed, arising from sub-distal endopod, reaching beyond its tip.

Second pleopod (Fig. 2C). Endopod in males about 0.71 length of exopod. Appendix masculina arising from base of endopod, trapezoidal,

TABLE 1. Length (L) and width (W), in mm, of pereopod segments of primary type specimens of *Caridina pedicultrata* sp. nov. P1-P5, pereopods 1-5.

	Dactylus		Propodus		Carpus		Merus		Ischium	
	L	W	L	W	L	W	L	W	L	W
HOLOTYPE MALE										
P1	0.60	0.18	1.00	0.49	0.93	0.44	0.91	0.29	0.29	0.21
P2	0.78	0.21	1.16	0.42	1.79	0.32	1.57	0.29	0.59	0.29
P3	0.35	0.14	1.73	0.19	1.36	0.33	2.23	0.47	0.53	0.32
P5	0.53	0.16	1.99	0.22	1.11	0.27	1.60	0.31	0.49	0.27
ALLOTYPE FEMALE #1										
P1	0.64	0.19	1.21	0.49	0.97	0.51	1.07	0.35	0.49	0.29
P2	0.84	0.18	1.49	0.43	2.28	0.40	1.96	0.33	0.91	0.30
P3	0.41	0.14	2.13	0.26	1.36	0.36	2.64	0.44	0.71	0.34
P5	0.51	0.15	2.21	0.22	1.29	0.29	1.88	0.29	0.57	0.29

very long, about same length as endopod, bearing many stout hamate setae on inner and distal parts. Appendix interna arising from about mid-appendix masculina, very short and coarse, with many retinaculacae distally.

Abdomen. Well developed, rotund, glabrous; sixth abdominal segment 0.32–0.39 CL.

Telson (Fig. 2D,F). 0.39–0.46 CL, distinctly longer than sixth abdominal segment, tapering posteriorly, ending in rounded margin with sharp, thin median hamate seta in some specimens, dorsal surface with 5–6 pairs of stout hamate setae including pair at posterolateral angles. Posterior margin with 2–3 pairs of intermediate plumose setae, middle one usually thinnest and shortest, all distinctly shorter than lateral pair. Uropods distinctly longer than telson, diaeresis on exopod bearing 19–22 hamate setae.

Egg size. Eggs with well developed embryos measuring 0.69–1.12 by 1.18–1.40mm.

Live colouration. All specimens light greenish blue.

ETYMOLOGY

From the trapezoidal, foot-like shape (pedicule = 'foot-stalk') of the appendix masculina of second male pleopod. It is used as a noun in apposition.

REMARKS

This species closely resembles *Caridina bamaensis* Liang & Yan, 1983 (from Guangxi) and *C. brevispina* Liang & Yan, 1986 (from Guizhou) but differs from those 2 species in the lateral carina

and some teeth on a much straighter rostrum, more slender first pereopod, broader dactylus and longer propodus of the third pereopod and the more trapezoidal shaped, long appendix masculina of the second male pleopod (Table 2).

The unique character of this species is the very long and trapezoidal shaped appendix masculina on the second male pleopod. No other atyid shrimp is known to have this. Its shape could be intermediate to the lanceolate one of known *Caridina* and the ovate one of *Neocaridina*. The shape of the endopod of the first male pleopod is also different from other *Caridina* and *Neocaridina*, but resembling the former. However, at this stage, we do not feel that the separation of this species into a new genus is warranted.

The large size of the eggs of *C. pedicultrata*

TABLE 2. Comparison of some morphometric characters of *Caridina pedicultrata* sp. nov., *C. bamaensis* and *C. brevispina*. am/ai, ratio of appendix masculina and appendix interna lengths on second male pleopod; C1, carpus of first pereopod; C2, carpus of second pereopod; D3, dactylus of third pereopod; P3, propodus of third pereopod; L, length; W, width.

	<i>C. pedicultrata</i>	<i>C. bamaensis</i>	<i>C. brevispina</i>
C1L/C1W	1.7–2.1	1.4–1.6	1.3–1.5
C2L/C2W	4.5–6.0	4.9–6.1	3.9–4.5
D3L/D3W	2.2–2.9	2.9–3.2	3.2–3.8
P3L/D3l	4.8–5.2	3.4z–3.9	3.2–3.8
Spinules on diaeresis	19–22	18–22	14–17
am/ai	>3	<2	c. 2

suggests highly abbreviated or direct development.

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